

6.2 QUANTITATIVE SAFETY ANALYSIS

A future crash prediction analysis was conducted for the SR 9/I-95 ramp terminals at Lantana Road, interchange ramp segments and the section of SR 9/I-95 and Lantana Road within the interchange influence area under the various project alternatives. The HSM Enhanced Interchange Safety Analysis Tool (ISATe) used for the safety analysis does not predict more than 23 years beyond the first year of the existing crash data (2014). Hence the 10-year period from the opening year (2025-2034) was used. The crash prediction analysis follows the methodology outlined in the Highway Safety Manual (HSM).

Expected crashes were predicted for the No-Action Alternative during the 10-year crash analysis period from the 2025 opening year to 2034 using the HSM Enhanced Interchange Safety Analysis Tool (ISATe). The expected crashes along the arterials for 2025 opening year and 2045 design year were also estimated for the No-Action Alternative using the HSM predictive spreadsheets for urban arterials. Both crash prediction spreadsheets implement the Empirical Bayesian Analysis methodology which combines the predicted crashes from the safety performance functions with the historical crash data to obtain the expected crashes.

For the arterial predictive analysis, since the spreadsheet does not include crash analysis over a period, a straight-line interpolation between the expected crashes for 2025 and 2045 was used to estimate the expected crashes for the 10-year period from 2025 to 2034. Based on the analysis, the estimated average crashes on the arterials was 31.0 crashes per year and 113.2 crashes per year within the interchange during the 10-year analysis period.

To obtain the expected crashes for the various Build Alternatives, Crash Modification Factors (CMF) obtained from the Federal Highway Administration (FHWA) CMF Clearinghouse was applied to the expected crashes for the No-Action Alternative. For Build Alternative 1, a CMF of 0.85 (15% crash reduction) for roadway capacity improvements from 4 lanes to 6 lanes (CMF ID: 7924) was utilized. For Build Alternative 2, a CMF of 0.592 (40.8% crash reduction) for converting a tight urban diamond interchange to a diverging diamond interchange (CMF ID: 9104) was utilized. In addition, a CMF of 0.85 (15% crash reduction) for roadway capacity improvements from 4 lanes to 6 lanes (CMF ID: 7924) was utilized for the Lantana Road widening. The crash reduction from these two improvements were then combined to obtain a composite CRF of 35.6%.

There is no CMF for Single Point Urban Interchanges (SPUI) available from the FHWA CMF Clearinghouse. A search through existing literature on SPUIs suggests that there is no significant difference in crash reduction between the Tight Urban Diamond interchange (TUDI) and SPUI configurations. However, the SPUIs were found to be safer than the comparable TUDIs for

injury/fatality crashes (Bared et al, 2005). Using a conservative approach, the same CMF for Build Alternative 1 was applied to Build Alternative 3.

All three Build Alternatives include providing additional lanes for the northbound and southbound off-ramps as well as access modifications to the Lantana road at Sunset Road intersection. These improvements are anticipated to further enhance safety within the interchange influence area by easing congestion and reducing conflict points.

Table 6-39 shows the average predicted crashes per year at the Lantana Road interchange and arterial segments. The detailed crash prediction analyses are provided in **Appendix T**.

Table 6-39 Predicted Crashes at Lantana Interchange								
Segment	Crash Severity	Expected Crash Frequency				% Change from No-Action		
		No-Action	Build Alt. 1	Build Alt. 2	Build Alt. 3	Build Alt. 1	Build Alt. 2	Build Alt. 3
Interchange	Fatal & Injury	53	45	31	45	-15.0%	-40.8%	-15.0%
	Property Damage Only	61	52	36	52			
Arterial	Fatal & Injury	11	9	9	9	-15.0%	-15.0%	-15.0%
	Property Damage Only	21	18	18	18			
Total		146	124	94	124	-15.0%	-35.6%	-15.0%

Based on the results shown in **Table 6-39**, Build Alternative 2 results in the lowest number of expected total crashes with an overall crash reduction of 35.6% compared to the No-Action Alternative at the Lantana Road Interchange. Build Alternative 1 and Build Alternative 3 provide similar overall crash reduction of 15% compared to No-Action Alternative at the Lantana Road Interchange.